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ABSTRACT

Two projects that have explored the feasibility of computer-generated verbal score reports for the Iowa Tests of Basic Skills are reported. The first, the Madison Project, designed, produced, and evaluated computer-generated testing reports that were useful to teachers and informative to parents. The reports, which were narrative in format, were structured as follows: the first five paragraphs described the pupil's performance on the Iowa Tests of Basic Skills as a whole and on each of the sub-tests; then, lists of specific areas were printed for which the pupil was diagnosed as either proficient or deficient. The teacher report was very similar to the parent report with the addition of imbedded percentile ranks. A class-summary report for the teacher was also generated. This report discussed the class as a whole and concluded with specific suggestions to the teacher for improving class performance in which their performance was weakest. Narrative testing reports were generated for a random half of 52 fourth-grade classes in 17 schools. The greatest shortcoming of these reports was the absence of a pupil report. In the second project, The Iowa Project, which developed a model for a narrative reporting system for the fifth-grade level Iowa Tests of Basic Skills, the most important changes from the Madison Project were: (1) the addition of a pupil report; (2) the inclusion of growth statements; and (3) the use of three alternative levels of the parent and pupil reports--levels that are based on overall pupil performance on the test battery. Examples of the parent and teacher reports from the two projects are provided. (DB)

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NARRATIVE REPORTS AND THE IOWA TESTS OF BASIC SKILLS

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The use of standardized tests in the schools of America is under serious fire. (See Black, 1963; Goslin, 1963, 1965, 1967; Gross, 1962; Hoffmann, 1962; McCarthy, 1968; Mahler and Smallenburg, 1963; Ohlesen, 1963.) Parents complain that test results are used to label children and to restrict their educational opportunities. Teachers complain that test results are misused to judge teaching effectiveness. Psychologists say that tests are responsible for inadequate self-concepts held by children. Critics have sometimes raised questions about the relevance of what is being measured by the tests, but generally, the criticisms have focused on how the test results are being used rather than on the tests themselves. It seems to me highly significant that at the same time that the NEA was calling for a moratorium on standardized testing in the schools, it was also calling on superintendents and boards of education to refuse to hire the graduates of teacher education programs if those programs failed to include instruction in the interpretation and use of tests. The call for a moratorium, then, appears to reflect a recognition that tests are professional tools and a belief that the profession is not at present adequately prepared to make proper use of the test results they are getting.

Ideally, when you seek medical advice, you expect that the physician will administer appropriate tests to determine how various bodily systems are functioning; and although you may know something about the numerical systems in which the test results are recorded, you will generally expect the physician to report, not the actual test scores, but verbal statements telling you what the numbers mean. The busy physician doesn't always succeed in achieving the ideal. Similarly, the ideal use of standardized tests in the educational setting would include an opportunity for all concerned individuals to have the results of testing explained in meaningful terms by somebody who has sufficient technical background to understand what the test scores mean, sufficient verbal skill to make the necessary translation, and sufficient time to do the job. Sometimes, particularly if teachers and administrators are unusually well trained and if the number of pupils to be served is small, practice approaching the ideal can be observed. Pupils, parents, teachers, school administrators, members of boards of education, and even the general public facing a vote on support for the schools - all are provided appropriate and meaningful interpretations of test results. Generally, however, there just aren't enough professional interpreters to get the job done on an individualized basis. Some new way must be found for dealing with the problem.

The electronic computer has proved highly useful in the scoring and reporting of test results in numerical form. But computer output is not limited to numerical output alone; if properly programmed, the

computer is capable of generating reports in narrative format. In this paper we report two projects that have explored the feasibility of computer-generated verbal score reports for the Iowa Tests of Basic Skills. The first, which we will refer to as the Madison Project, might be considered a pilot study involving, on a small scale, all the steps in the development and use of a verbal reporting system. The second, the Iowa Project, has concentrated on the development of a comprehensive reporting model, that is, a detailed plan for turning numerical reports into verbal reports that will communicate clearly and accurately to the intended audience. Unless this can be accomplished, it doesn't make much sense to undertake the expensive and time-consuming task of building the reporting system itself.

THE MADISON PROJECT

The purpose of the Madison Project (Mathews, 1972) was to design, produce, and evaluate computer-generated testing reports that would be useful to teachers and informative to parents, without requiring either parents or teachers to spend a lot of time preparing the reports or learning how to interpret them. In both cases, the reports were in a narrative format. A unique report was generated by a computer for each pupil, based on his scores on the fourth-grade level of the Iowa Tests of Basic Skills.

Attempts were made: to increase the communicative role of the reports by putting them in a narrative format; to personalize the reports

by lacing each report with the pupil's name and the appropriate personal pronouns; to make the reports more understandable by eliminating or deemphasizing certain interpretative concepts (viz. grade-equivalent scores and percentile ranks) that sometimes are not fully understood; to make the reports more informative by indicating possible proficiencies and deficiencies; to make the reports more useful to teachers by generating suggestions for change and sources for assistance; to make the reports more valuable to parents by giving them a permanent copy.

Verbal descriptors were chosen to correspond to different ranges of percentile ranks, and a basic form for the explanatory paragraphs was developed, and then several parallel forms of each paragraph were written to provide variety of style. The first five paragraphs of each report described the pupil's performance on the test battery as a whole and on each of the sub-tests. Next, lists of specific areas were printed for which the pupil was diagnosed as either proficient or deficient--areas, in which he was neither, were suppressed. These decisions were based on item analyses performed by the teachers in the Madison (Wisconsin) Public Schools and criterion levels set by them.

Figure 1 about here

Figure 1 is a sample of a report to parents. The teacher report was very similar to this report, with the addition of imbedded percentile ranks. The parent reports were distributed at a parent-teacher conference and were the basis for a discussion of the child's performance.

One other report was generated--a class-summary report for the teacher. This report was similar in format to the report on an

individual student, but it discussed the class as a whole and concluded with specific suggestions that might be useful to the teacher in improving class performance in the tested areas in which their performance was weakest.

Narrative testing reports were generated for a random half of fifty-two fourth-grade classes in seventeen schools. Three major conclusions were reached as a result of the evaluation of the narrative reports when compared to the traditional reports: (1) The teachers preferred receiving the narrative reports to the traditional reports; (2) the teachers who received the narrative reports felt better prepared to communicate information obtained from the tests to the parents of their pupils than did teachers who received the traditional reports; (3) receipt of the narrative reports had a greater impact on the teachers' perceptions of pupil performance than did receipt of the traditional reports.

The Madison Project did a respectable job at what it did, but it did not do enough. It took a major step in humanizing testing reports and in offering an alternative to the obstacle of terminology and numerical ratings, but it only reported the pupil's performance compared to other fourth graders--no reference was made to the child's performance compared to his own previous performance. The Madison reports generated the same basic format for all children, making no allowances for different needs at different levels of performance. The greatest shortcoming of these reports, however, was the absence of a pupil report.

THE IOWA PROJECT

A project conducted during the summer of 1972 under the auspices of the Iowa Testing Programs developed a model for a narrative reporting system for the fifth-grade level Iowa Tests of Basic Skills. The model built upon the Madison Project, but the emphasis was on the basic conceptualization rather than on developing the technology for implementing the model.

The most important changes from the Madison Project to the Iowa Project were: (1) the addition of a pupil report; (2) the inclusion of growth statements; and (3) the use of three alternative levels of the parent and pupil reports--levels that are based on overall pupil performance on the test battery. An example of the kind of pupil report we developed appears as Figure 2.

Figure 2 about here

The growth statements are verbal in nature and are based on the difference between the score obtained by the pupil on the current year's testing and the score obtained at some previous administration, usually one year earlier. The three alternative levels of the parent and pupil report approach their audiences from different bases: a low performing pupil is given encouragement after showing growth, even though his performance level is low, while a high-performing pupil may be given specific suggestions on how to improve in an area in which his performance is high, if it is his weakest area.

Other changes also were designed: the parent report (see Figure 3) was expanded to include a general explanation of tests and test results;

suggestions for increasing performance were included in the parent and pupil reports; comments to reinforce growth were added; the reading level of the reports was lowered; the teacher report was shrunk to a skeletal report (see Figure 4).

Figures 3 and 4 about here

CONCLUSION

There is no doubt that testing reports in narrative format can be prepared using computer technology; the basic question is whether or not such reports can be made sufficiently accurate and informative to warrant the expense of developing an operating system.

The Madison project showed that, at least from the viewpoint of parents and teachers using the reports, even a very simple system does seem to facilitate communication. The Iowa Testing Programs summer project has demonstrated that a much more sophisticated model can be developed. The next steps are to see whether or not this more complex model will turn out to provide meaningful information to pupils, parents, and teachers and whether or not it is economically feasible to implement the model on a large scale.

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Figure I

PARENT REPORT ON INDIVIDUAL PERFORMANCE ON THE IOWA TESTS OF BASIC SKILLS
ADMINISTERED SEPTEMBER 1970
MADISON PUBLIC SCHOOLS
MADISON, WISCONSIN

STUDENT: DANIEL MARSHALL
TEACHER: MRS. ANASTASI

ACCORDING TO THIS TEST, DANIEL'S OVERALL ACHIEVEMENT LEVEL IS AT THE 75 PERCENTILE WHEN COMPARED WITH STUDENTS IN GRADE 4 IN THE MADISON SCHOOL SYSTEM, AND AT THE 79 PERCENTILE WHEN COMPARED WITH A NATIONAL SAMPLE OF GRADE 4 STUDENTS.

THE TEST PROVIDES INFORMATION IN FIVE MAIN AREAS: DANIEL'S VOCABULARY SCORE IS NEAR AVERAGE. IN THE AREA OF LANGUAGE SKILLS HIS SCORE IS QUITE STRONG, AND HIS SCORE IN WORK-STUDY SKILLS IS VERY STRONG. HIS ARITHMETIC SCORE IS EXCEPTIONAL.

THE TEST LOOKED AT FOUR SPECIFIC LANGUAGE SKILLS, AND THIS STUDENT WAS RATED AS FOLLOWS: QUITE STRONG IN SPELLING AND QUITE STRONG IN CAPITALIZATION. RATHER WEAK IN PUNCTUATION AND NEAR AVERAGE IN WORD USAGE.

IN THE AREA OF WORK-STUDY SKILLS, THREE SPECIFIC SKILLS WERE TESTED. IN MAP READING, DANIEL SEEMS TO BE QUITE STRONG WHILE HE IS NEAR AVERAGE IN READING GRAPHS AND TABLES. IN HIS KNOWLEDGE AND USE OF REFERENCE MATERIALS HE IS QUITE STRONG.

IN THE AREA OF ARITHMETIC, HE APPEARS TO BE NEAR AVERAGE IN CONCEPTS AND VERY STRONG IN PROBLEM SOLVING WHILE HE TENDS TO BE EXCEPTIONAL IN THE MODERN MATHEMATICS SUPPLEMENTARY TEST.

DIAGNOSTIC KEYS INDICATE THAT DANIEL IS PROFICIENT IN:

SOLVING PROBLEMS INVOLVING MONEY.
SUBTRACTION.
ADDITION.
UNDERSTANDING THE CONCEPT OF WHOLE NUMBER IN MODERN MATH.

DIAGNOSTICS ALSO INDICATE THAT DANIEL IS DEFICIENT IN:

SPELLING BECAUSE OF PROBLEMS IN VOWEL SUBSTITUTION.
USING THE COMMA.
PUNCTUATION BECAUSE OF OVERPUNCTUATION.

STUDENT PERFORMANCE IS EVALUATED IN SEVERAL WAYS: BY THE TEACHER, BY THE PARENTS OF THE STUDENT AND, OF COURSE, BY THE STUDENT HIMSELF. TEST RESULTS DO NOT REPLACE ANY OF THESE, BUT CAN BE VALUABLE IN THAT THEY ARE ANOTHER SOURCE OF DATA. THIS TEST, LIKE ANY TEST, IS SUBJECT TO ERROR.

COMMENTS ABOUT DANIEL MARSHALL FROM MRS. ANASTASI:

Figure 2

PUPIL REPORT ON PERFORMANCE ON THE IOWA TESTS OF BASIC SKILLS
Administered January 1973
Iowa City Public Schools
Iowa City, Iowa

HORACE MANN SCHOOL

Pupil: JOHN BLACK GRADE 5 Teacher: MRS. RICHARDSON

A few weeks ago, you took the Iowa Tests of Basic Skills. You may remember that it had questions on vocabulary, spelling, capitalization, punctuation, and reading maps, graphs, and tables. There were also questions about short stories you were asked to read, and there were problems in arithmetic, too.

These tests give you a chance to find out how you are doing in the skills that are used in school. Your teacher gave the tests to everyone in the class to help her see where the class needs most work. Another reason for giving the tests was to give you information on your skills--which skills are strong, and which ones are weak. It's good to find out which skills need attention, because then you can work to improve them.

This report will tell you how you did in the tests. The first comment for each test tells you how strong or weak your score was in that test. Your score is compared to the scores of other students in sixth grade in Iowa. Your score is also compared to the score you had on a similar test you took in the fourth grade. This shows how much you have grown in that area since last year.

VOCABULARY

In the test on vocabulary, your score was near average. Your growth during the past year was below average. One good way to improve your vocabulary would be to take a little time to look in the dictionary for the meaning of words you are not sure of. It takes extra time, and sometimes you might have to look up the same word several times before you remember its meaning. But your vocabulary will get bigger and you will better understand what you read and hear. And you will be better able to express what you think.

READING COMPREHENSION

Your performance on this test was strong. You showed normal growth in reading in the past year. In this test you did very well in seeing and understanding important facts and details in what you read.

LANGUAGE SKILLS

On the four tests that measured the mechanics of writing, your overall performance was near average. Your growth from last year was below average. These are some areas where a little extra work would pay off.

SPELLING--Your score on this test was very weak. You showed minimum growth since last year. It appears that you sometimes are not

Figure 2 (cont.)

sure which vowels correctly spell a word. If you really want to improve your spelling, you can! Use a dictionary to check spellings. Your teacher will give you help too, if you want it.

CAPITALIZATION--In capitalization your performance was near average. You showed normal growth.

PUNCTUATION--Your performance in this area of language skills was less than average. Your growth was below average. You tended to use too much punctuation.

USAGE--Your performance in the proper use of words was near average. Your growth since last year was normal. In this test you did very well in using verbs.

WORK-STUDY SKILLS

There were three tests that measure work-study skills: a map reading test, a test of reading graphs and tables, and a test of your knowledge and use of reference materials. In general, your performance was near average. You showed normal growth.

MAP READING--Your score on this test was near average. Your growth since last year was below average. You seemed to have trouble locating places on maps and globes. Some practice in using a map of Iowa City and the state of Iowa would be helpful. (The attendant at a gas station might give you a map if you asked for it.)

READING GRAPHS AND TABLES--In this test your score was strong. Your growth in this area was above average. You've improved in this area and should be proud of it.

REFERENCE MATERIALS--Your knowledge and use of reference materials is near average, according to the test. You've shown normal growth since last year. You did miss questions on the use of an index.

MATHEMATICS SKILLS

Your overall performance in the two tests of arithmetic skills shows that you are strong in this area. Your growth in these skills since last year was above average. Keep it up!

MATHEMATICS CONCEPTS--Your score on this test was strong. You showed above average growth in this area.

MAHHEMATICS PROBLEM SOLVING--You have shown strong performance in this area. Your growth in this skill was above average. You did well in solving problems involving money.

In general, these tests show that you have done very well in improving your mathematics skills in this past year, but not so well in vocabulary and language skills. You will want to pay close attention to spelling and punctuation. You also showed good progress in reading graphs and tables.

Figure 2 (cont.)

Of all the five test areas, you did best in mathematics. You need to improve the most in work-study skills, especially map reading and using reference materials. You could also improve your language skills, mainly spelling.

There are other things you do at school that are also important. You are growing in many ways, not only in your skills, but also as a person. The Iowa Tests of Basic Skills do not measure these other areas of growth, so they have not been talked about here. It's important that you, your parents, and your teacher talk about these other areas--your everyday activities in all areas of school, your interests, and how you feel about school. That way, all of you can be more sure that you are getting the most out of your experience in school.

Figure 3

PARENT REPORT ON PUPIL PERFORMANCE ON THE IOWA TESTS OF BASIC SKILLS
Administered January 1973
Iowa City Public Schools
Iowa City, Iowa

Pupil: JOHN BLACK HORACE MANN SCHOOL GRADE 5 Teacher: MRS. RICHARDSON

John's school experience is evaluated in many ways and by various people: by his teacher; by you; and by John, himself. Each of you may have formed a somewhat different opinion and for different reasons. Test results do not replace these important judgments, but they provide another kind of information to the total picture of how well John is doing.

Last month, John took the Iowa Tests of Basic Skills, a series of tests covering a wide range of skills that are important for his future educational development. This report will give you a description of John's performance as compared to that of other fifth grade students and also as compared to his own performance last year. Remember, however, that the Iowa Tests of Basic Skills, like any test, can only sample some kinds of school performance. No test can tell the whole story.

For each test area of the Iowa Tests of Basic Skills, two kinds of information about John's performance are provided. First, a performance statement--his performance in each skill is compared to that of other fifth graders in Iowa. Second, a growth statement--his performance this year is compared to his performance last year in order to see his growth in each skill.

VOCABULARY

John's performance on this test was near average compared to the performance of other fifth grade pupils in Iowa. He showed below average growth in this area since last year. You might encourage him to look in a dictionary for word meanings whenever he is uncertain.

READING COMPREHENSION

On this test, John's performance was strong. His scores showed normal growth in this area in the past year. He did very well in recognizing and understanding important facts and details in what he read.

LANGUAGE SKILLS

These tests measured John's skills in the mechanics of writing. His overall performance in language skills was near average. His growth from last year was below average. Encourage John to take the time to describe fully an event he has experienced. He may then be encouraged to put it in writing and mail it to a friend or relative.

SPELLING--John's performance in the spelling test was very weak. He showed very little growth since last year. He tends not to notice wrong vowels in misspelled words.

Figure 3 (cont.)

CAPITALIZATION--In this test John performed near average. He showed normal growth in capitalization in the past year.

PUNCTUATION--John performed near average in the test of punctuation. His growth was less than average. He tends to include punctuation when it is not necessary. This is usually an indication that the pupil is not sure of the rules of punctuation.

USAGE--In the test of the proper use of words (for example, nouns, verbs, and adjectives), John performed near average. His growth in this area was normal. He did very well in the use of verbs.

WORK-STUDY SKILLS

On these tests of study methods, his performance was near average. He showed normal growth in this area since last year.

MAP-READING--John's score was near average in map reading. His growth since last year was below average. One area John could use more work in is locating places on maps and globes. Letting him help read the map when you travel would aid him in this area, particularly if he helped to calculate distances and to interpret the symbols used on the map.

GRAPHS-TABLES--Reading graphs and tables is a skill in which John's performance was strong. His growth in this area was above average.

REFERENCE MATERIALS--John's knowledge and use of reference materials is near average. His growth was near average in this area. It would be good if John developed the habit of looking up answers to questions that he has, by using a dictionary, encyclopedia, atlas, and other reference materials. Use of an index is a specific area in which he needs practice.

MATHEMATICS SKILLS

John's performance in this area shows that his mathematics skills are strong. His growth in mathematics since last year was above average, and that's good improvement.

MATHEMATICS CONCEPTS--In understanding the concepts involved in mathematics, John's performance was strong. He has shown above average growth on this test.

MATHEMATICS PROBLEM SOLVING--John's score in solving mathematical problems was strong. He has shown above average growth in problem solving. He did well in solving problems involving money. He did well in subtraction.

Let's summarize his growth during this past year. John Black progressed very well this past year in his mathematics skills, but not so well in vocabulary

Figure 3 (cont.)

and language skills, particularly spelling and punctuation. He showed good progress in reading graphs and tables.

Now let's summarize John's performance on this test this year. It can be said that he did best in mathematics and he needs improvement the most in his work-study skills (especially map reading and using reference materials). He also could improve his language skills (particularly spelling).

This information used in conjunction with observations provided by you, John's teacher, and John should result in better meeting the goal you all share: helping John make the most of his experience in school.

In order to make this report as accurate and up-to-date as possible, Mrs. Richardson has added her comments below.

Figure 4

TEACHER REPORT ON INDIVIDUAL PERFORMANCE ON THE IOWA TESTS OF BASIC SKILLS
Administered January 1973
Iowa City Public Schools
Iowa City, Iowa

Pupil: JOHN BLACK

HORACE MANN SCHOOL
GRADE 5

Teacher: MRS. RICHARDSON

The first part of each comment refers to John's test performance this year. (The percentiles show his performance compared to other pupils in Iowa.) The growth statements refer to John's test performance this year compared to last year's testing.

VOCABULARY	Near average performance (61%ile) and below average growth.
READING COMPREHENSION	Strong (71%ile) with normal growth. John did very well in recognizing and understanding important facts and details in reading.
LANGUAGE SKILLS	Near average performance (45%ile) with below average growth.
Spelling	Weak (28%ile) with minimal growth. Vowel substitution is an area in which John needs help.
Capitalization	Near average performance (48%ile) with normal growth.
Punctuation	Near average performance (40%ile) with less than average growth. John tends to use too much punctuation.
Usage	Near average performance (62%ile) with normal growth. He did very well in using verbs.
WORK-STUDY SKILLS	Near average performance (44%ile) with normal growth.
Map Reading	Near average performance (34%ile) with below average growth. Locating places on maps and globes in a problem for John.
Graphs-Tables	Strong (73%ile) with above average growth.
Reference Materials	Near average performance (40%ile) with normal growth. Use of an index is an area in which he needs help.
MATHEMATICS SKILLS	Strong (76%ile) with above average growth.
Mathematics Concepts	Strong (72%ile) with above average growth.
Problem Solving	Strong (79%ile) with growth that was above average. He did well in solving problems involving money. He did well in subtraction.